Don's Airbrush Tips

By Donald Wheeler

Copyright 2013
Donald Wheeler
All rights reserved

Preface

In 2004 I retired. And, I kept pretty busy for a while with a bunch of little things I had been wanting to do. But I soon found I had time on my hands. One day I visited one of the few remaining hobby shops in our area. When I was a kid, like a lot of guys my age, I had built a few models. Before long I was building them again. Well, after a couple of kits, I decided that an airbrush would be a nice thing to have. And so began my airbrush adventure.

I was totally ignorant about them. But, after doing a little on-line research, I bought a Badger 155 Anthem. It turned out to be a good choice for me.

I had problems. At first I spent as much time wiping paint off as I did applying it. I did not have a natural talent for airbrushing. But, I was intrigued by the device and I studied and experimented and learned, and eventually got to where I could pretty reliably lay down a nice even coat.

I learned a lot from joining a few modeling forums. And after a while I began pitching in and helping out other beginners. But forum answers tend to be pretty brief and transitory. And the same questions pop up over and over again. I thought it might be fun to create a little web site that was more thorough and permanent. So, in 2008 I created a site called Don's Airbrush Tips. I got good responses and the site has since grown to over 60 pages of tips and reviews.

A while back I won a Kindle Fire e-reader in a raffle. I started looking for books and discovered that it's possible for anyone to publish a book on Amazon at no cost. I like to write, and I figured, why not? Maybe I can help a few more people who are having the same problems I had. Also, my website just sort of grew over several years, and it looks it. This gives me a chance to create something a little more coherent and better organized.

So, here it is. It won't make you a master airbrush artist. This is not a book about airbrush technique. I'm not qualified to write such a book. And there are already many good ones of that type available. But it might help you understand how the airbrush works and how to keep it working.

I hope you find the book useful.

Instead of a special dedication page, I'll just say my sincere thanks to the companies and individuals who supplied me with most of my airbrushes, and to the many who gave me comments, tips, and encouragement. Thank you.

Table of Contents

Don's Airbrush Tips....1

Preface....2

How Does It Work?....5
- External Mix....5
- Internal Mix....8

The Mechanical Parts....13
- Single Action....14
- Double Action....16

Air Valves....19

The Needle Seal....21

Paint source....23
- Gravity fed....23
- Siphon fed....23
- Side fed....25
- Which is better, siphon or gravity fed?....26

Air Sources....28

Safety....32

Cleaning....33

Practice....40
- Thinning....42

Troubleshooting....44
- Straightening a bent needle....55

Which airbrush should I buy?....57

Tuning....59

Fine Lines....65

Conclusion....68

How Does It Work?

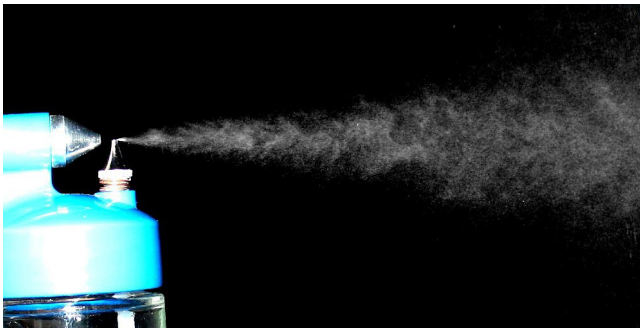
External Mix

Let's start with something simple. Here is an airbrush that is about as simple as you can get, the Badger 250. In fact, Badger calls it a spray gun rather than an airbrush. Other manufacturers make something similar. Technically, it is a single action siphon air brush.

Maybe you have seen perfume bottles with a rubber bulb. You squeeze the bulb and perfume sprays out. The 250 works the same way. Except, instead of a bulb, there is a hose connection to an air source and a trigger button to turn the air on and off. Notice the tube inside the bottle. At the top it is attached to a metal nozzle with a tiny hole in it. The nozzle is threaded so that its height can be adjusted. There is a spring under the nozzle that gives a little resistance so it will stay where you set it.

When you press the trigger, air blows across the nozzle. This causes a vacuum that draws paint up the tube and atomizes it. The vacuum is the result of something called the Venturi effect,

which I won't even try to explain. But, trust me, it works. To control the amount of spray, you screw the nozzle in or out. Here is a photo showing what the spray looks like. It was taken with a flash.

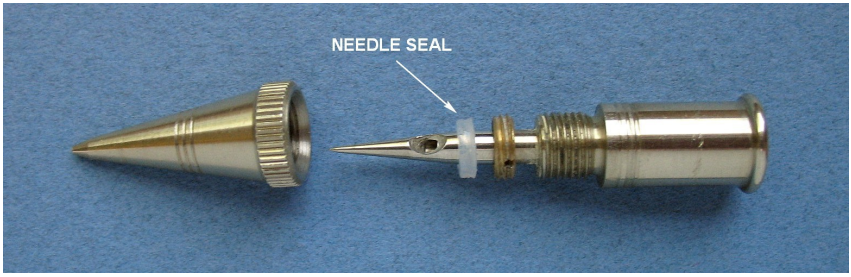


Something that you can't see in the picture is a tiny vent hole over the jar. To spray liquid out, you have to let replacement air in. If the vent gets clogged, you won't spray for long. Try to remember this because it is true for any airbrush.

The 250 can actually give decent results with a little practice. But the spray is not very controllable.

So now let's move on to something a little more complicated. Long long ago in a workshop far far away, someone discovered that putting a needle in the nozzle produced a finer spray. That developed into an airbrush like this one, the Paasche H. Again, other brands make similar airbrushes.

The Paasche H is also a single action siphon airbrush. You can attach either a special bottle or a 1/4oz. metal cup as a paint source. Here is how the needle and nozzle come apart.



The needle is hollow. Paint enters from the back and exits out the little hole near the point. Behind the hole is the Teflon needle seal that keeps paint from leaking. There is an adjustment collar just behind the seal. Tightening it makes the seal more snug.

Here is a photo of the business end of the H.

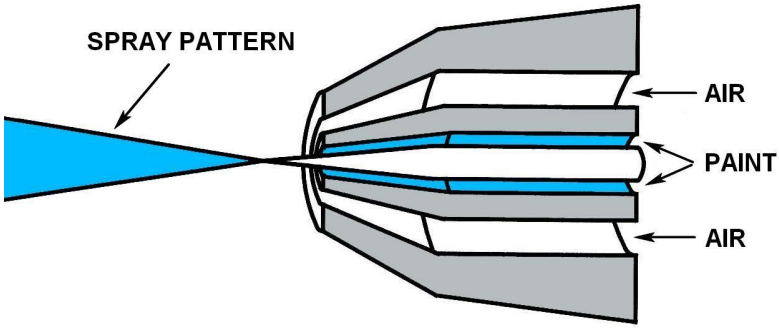
Notice the needle sticking out of the nozzle. The nozzle is threaded so that turning it changes the opening between the needle and the nozzle. This gives very fine control over the spray pattern. Again, the air blowing across the nozzle creates a vacuum and draws paint up and out. But now there is a needle in the way. It turns out there is something called the Coanda effect that makes the paint cling to the needle until it reaches the tip.

This results in a spray with finer droplets and a narrower pattern. Paasche supplies three sizes of needle, nozzle, and air cap for the H to accommodate different media viscosity and produce wider and narrower patterns. The H and the similar Badger 350 are perfectly adequate airbrushes for many purposes, including painting models. There are pros who use nothing else.

Internal Mix

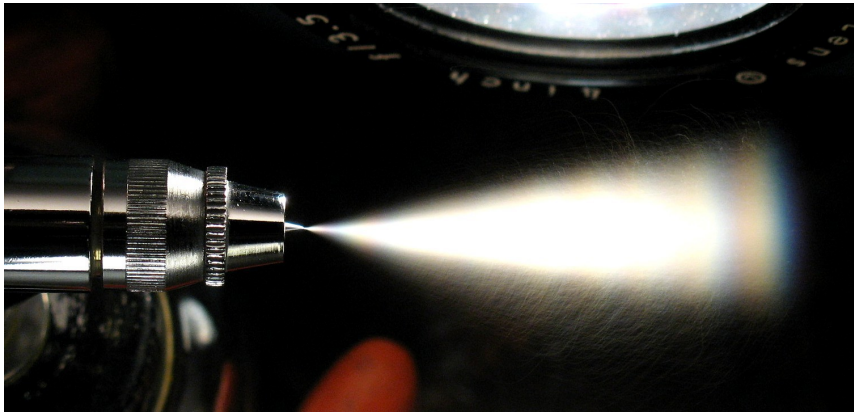
So far we have looked at airbrushes that are considered external mix. There is no argument here. The air and paint clearly don't combine until the tip of the nozzle, which is clearly external. Now let's look at the next step up in complexity, the internal mix airbrush.

Here is my sketch of an internal mix airbrush head.



As in the external mix, paint exits the nozzle around the needle. But this time the air comes out through a circular opening around the nozzle and needle and in line with it. This results in an even finer spray. I show the front surface of the head as being flush with the nozzle. But if the nozzle doesn't protrude just a tiny bit, there will be pressure rather than vacuum and air will blow back into the paint supply. This is worth remembering.

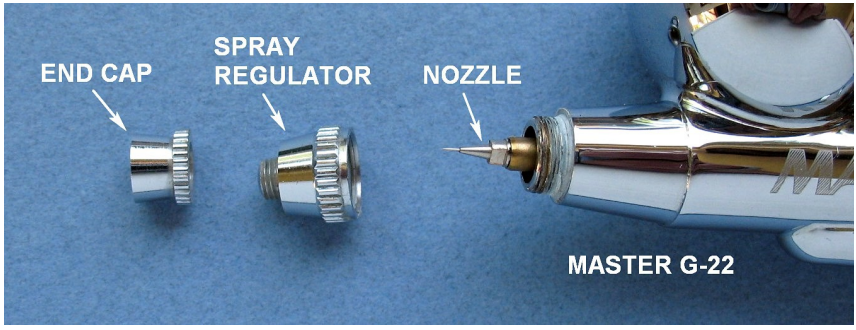
Here is a photo I took of the output of my Badger 155 Anthem airbrush. The spray is water, and the light source is an old slide projector.



Notice that the spray starts right at the end of the needle, just like on an external mix airbrush. Often the statement is made that paint mixes with air somewhere inside an internal mix airbrush. This is just not true. It mixes right at the needle. I think this confuses a lot of people.

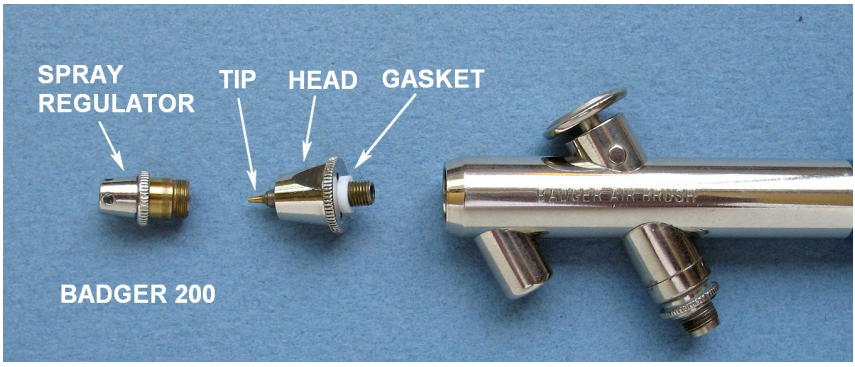
Let's look at a couple of typical internal mix head assemblies.

First an old design, but still very common. This is the head of a Master G-22 airbrush.



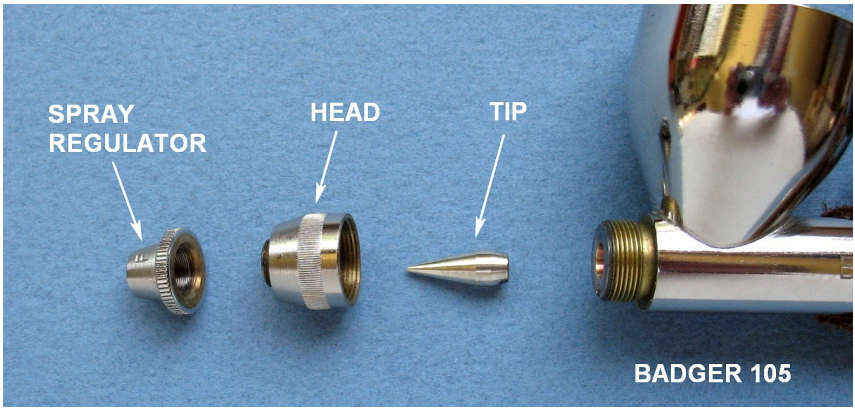
In this type, the nozzle, which is called a tip by some manufacturers, is a tiny thing that screws into the airbrush body. These are very fragile, and are easy to strip or break off if they are over tightened. The G-22 has a rubber O-ring under the tip. But most of this type just use a little sealant, like bees wax, on the threads. The spray regulator channels air around the tip. It is important that the nozzle centers well inside opening in the spray regulator. If it doesn't you will get a distorted spray pattern. The end cap is just a guard for the needle. You can spray without it if you are brave.

Here is the head assembly of an old style Badger 200. It is the same as used on the Badger 100 series, and you may see variations of it in other brands.



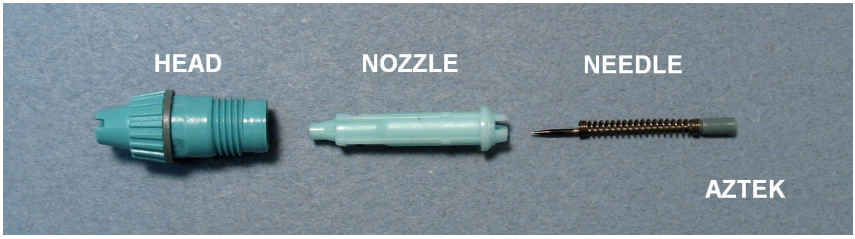
It also has a tiny threaded tip. But, it is screwed into a head that is removable for cleaning. The head and tip are sold as an assembly, so there is less chance to damage the tip. A disadvantage is that there is now a Teflon gasket between the head and body. It does compress over time, and if it leaks, you will get bubbles in the paint supply. Sometimes a little Chapstick or bees wax on the threads will cure the problem. The spray regulator must be installed for the airbrush to function.

Here is the head assembly of a Badger 105 Patriot airbrush.



This is a newer design found on many airbrushes. The tip is held in place by compression between the head and body. There is a metal to metal seal between the tip and body, so both surfaces must be clean and round. If they are not, you will get bubbles in the paint cup. The parts are relatively large and easy to handle and clean. The spray regulator must be installed for operation.

Here is the head assembly from a Testors Aztek airbrush.

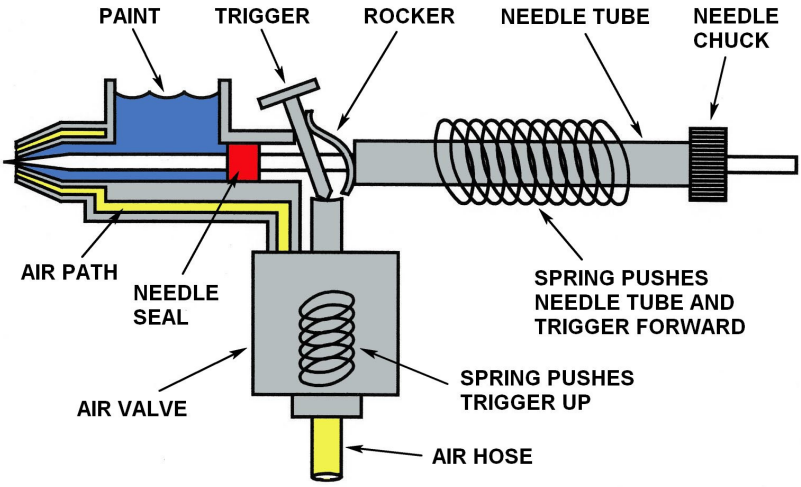


As you can see, it is entirely different. The head screws into the plastic airbrush body. The center part is the nozzle. It is plastic too and the front opening is very fragile. The nozzle clicks into place inside the head. At the right is the needle, which is part of the head assembly in the Aztek.

Different brands and models have variations of these types, but they all function the same. So, that's the basic technology. Everything else on an airbrush is just a means of supplying and controlling the flow of air and paint to the head.

The Mechanical Parts

This is where manufacturers get creative. Here is a schematic drawing I made to illustrate the rest of a typical internal mix airbrush. In this case it is a gravity fed brush. That just means the paint sits in a cup on top rather than being drawn up from below.



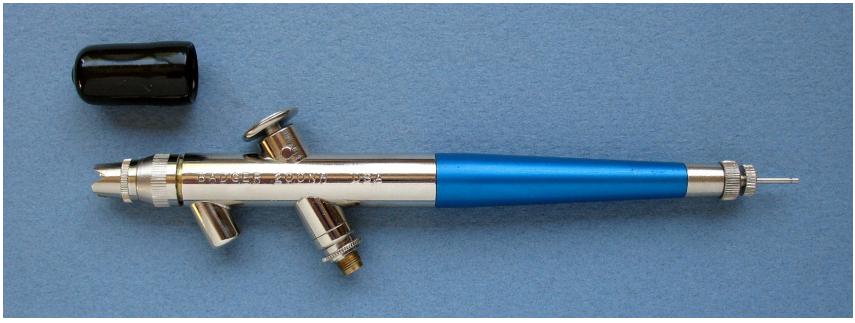
Paint is held in a cup on top of the airbrush. It is prevented from entering the rear of the brush by the needle seal, which is sometimes called a needle bearing. The needle slides through the seal and passes through holes in the trigger, the rocker, and the needle tube. The rocker is sometimes called a back lever. The needle is locked to the needle tube by the needle chuck. There is a spring around the needle tube that pushes the trigger all the way forward. The needle is positioned so that when the trigger is all the way forward, the needle is fully seated in the nozzle, sealing off the paint exit path. Pulling back on the trigger causes the needle to retract and allows paint to flow out the nozzle. Pushing down on the trigger opens the air valve and allows air to escape

the nozzle and create a Venturi effect that draws paint down the needle tip and spray in a conical pattern.

That may seem a little complicated. But if you take the time to really understand it, it could make troubleshooting much easier later on.

Single Action

The drawing above is a double action airbrush. There is also a type called single action. The only difference is that on a single action the trigger just goes up and down to control air. Instead of pulling back on the trigger, the needle position is set by a threaded adjustment. Here is a photo of a Badger 200NH, which is that type. Notice the adjuster on the rear of the handle just in front of the needle chuck.



Also notice that the paint inlet is on the bottom. That's because this is a siphon or bottom fed airbrush.

Some double action airbrushes will simulate a single action. Here is one method. This is the trigger of Paasche VL airbrush. The knurled wheel lets you pre-set the trigger so that paint sprays as soon as you press down on it.

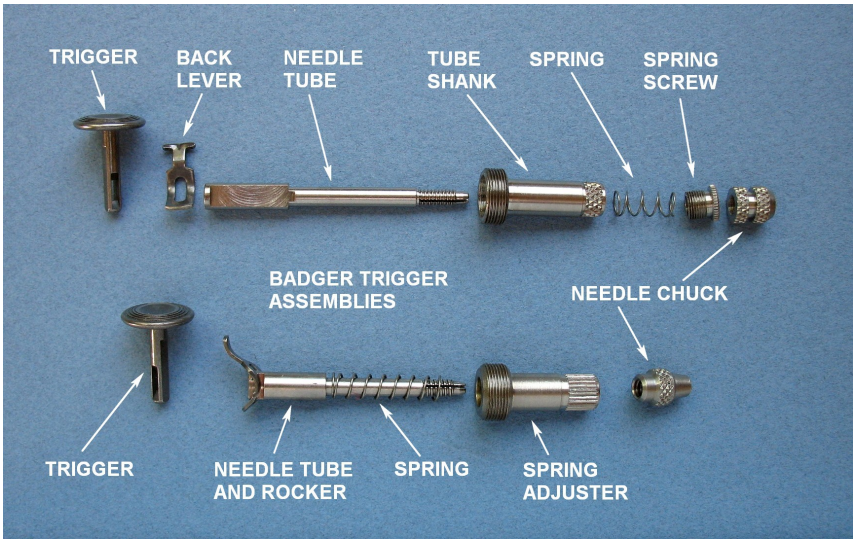
Here is another method that is pretty common.

This is a Paasche Talon airbrush. There is an adjuster at the rear of the handle that can limit how far back the trigger can be pulled. With this type, the trigger has to be pulled back to spray, but it can only go back as far as you set the limiter.

The advantage of a single action airbrush is that the output will be constant until you readjust the needle position or limiter. But that is also the disadvantage. You don't get the flexibility of control that a double action allows.

Double Action

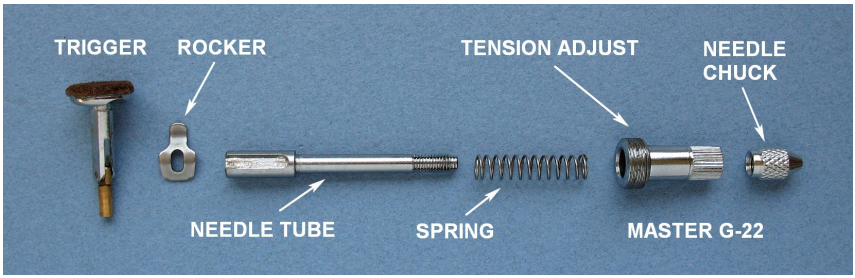
Let's look at the double action airbrush a little closer. As I mentioned, in a double action the trigger has two functions. You push down for air and pull back for paint. The pull back part is the most complicated. Here are a few types you might run into. First a couple of Badger versions.



In the top one, the needle tube is kept from rotating by a flat surface that fits in a D shaped opening in the tube shank. Because of this the tube shank must be tightened all the way or else the whole thing will rotate when you tighten or loosen the needle chuck. Back tension can be adjusted with the spring screw. The back lever is a little more difficult to install because it is a separate part.

In the bottom type, the needle tube is permanently attached to the rocker. The rocker has a tab that rides in the trigger slot, and this keeps the assembly from rotating. So there is no tube shank and the spring adjuster can be set however you like. As far as function, they feel the same to me.

Here is a very common version. This one is from a Master G-22 airbrush.

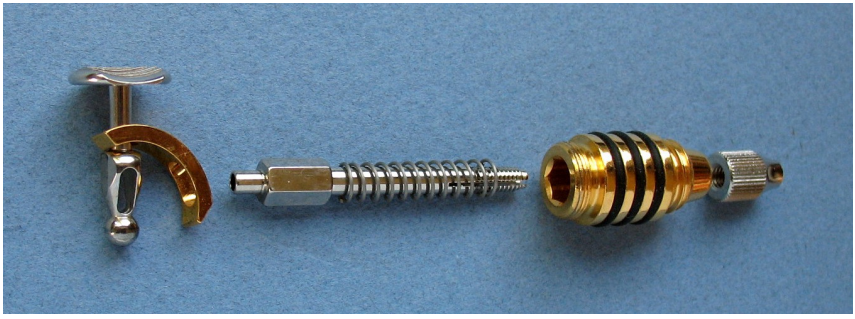


Notice the trigger has a pivoting pin on the bottom. This passes through a rubber O-ring in the bottom of the airbrush body and is a bit tricky to install. The rocker is separate, and the needle tube is kept from rotating by a groove that rides on a pin that screws in from the bottom of the body. The tension adjust can be set any way you like.

Here are a couple of versions from Harder & Steenbeck. The first is from their Ultra X model.

In this one the needle tube is kept from rotating by a square section on the front of it that fits in a rectangular hole in the rocker. The knurled piece allows a small amount of tension adjustment.

This next assembly is from their Evolution Solo model.



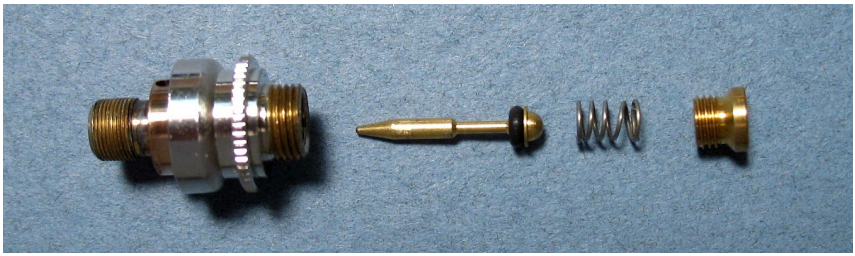
Here the needle tube has a hexagonal shaped section that fits in a matching hole in the tube shank, the gold piece with three black rubber rings. This piece must be tightened all the way to prevent rotation. There is no tension adjustment on this model. The gold plating is real.

So, you can see that there are many ways to do the same thing. You may see variations of these or something entirely unique. But they all function pretty much alike. And in normal use you should very rarely need to dismantle them.

There is one other type which I don't own, but should mention. There are airbrushes with a pistol type grip. They are double action too. The way they work is that the first part of the trigger pull turns on air only. As you pull back further, the needle begins to retract and paint sprays. Opinion on these varies a lot. Some people with hand problems find them easier to use and some don't. They are just as capable as the conventional style.

Air Valves

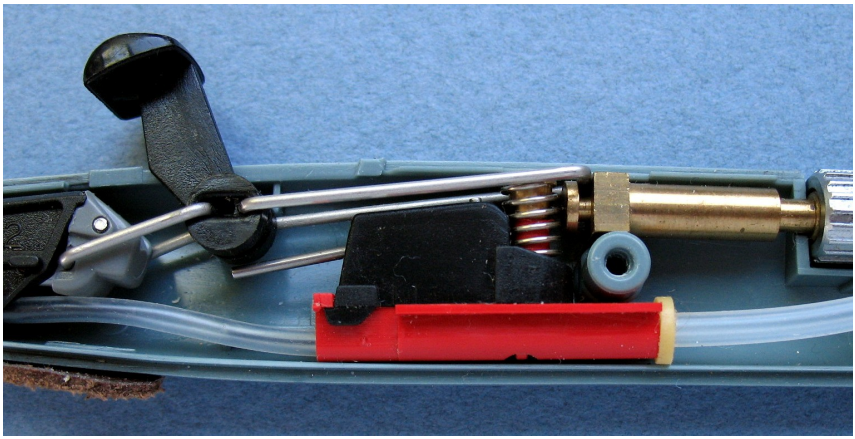
The air valve that the trigger pushes down on is pretty standard. Here is the one used in Badger airbrushes. The retainer behind the spring is removable with an allen wrench.



It is a poppet valve, similar to the schrader valves in your car tires. It is pretty much either on or off. As you can see, there are some pretty small parts. The tiny black O-ring is sensitive to solvents. If exposed to them, it can swell up and jam. Needless to say, keep solvents out of the air valve.

Most other brands will be similar to this. Some require special tools to dismantle, and some have an O-ring at the top to seal the plunger from air leaks. Sometimes these jam and need a little lube to free them up.

Here is the valve in the Aztek airbrush. Wouldn't you know it would be way different.



The spring causes the black part to pinch a flexible tube inside the red part and shut off the air. When you press the trigger, it causes the black part to pivot up against the spring and relax the pressure on the tubing inside. This allows air to pass. It has a very soft mushy feel to me.

The Needle Seal

The needle seal isolates the front wet part of the airbrush from the rear dry part. You can probably guess what happens if it leaks. It can be messy.

There are three ways of accomplishing this seal.

1. A gasket, usually PTFE (Teflon is one brand), with a compression adjustment.

2. A pressed-in gasket/bearing, also PTFE.

3. A plain hole in the body that is just barely big enough to allow the needle to pass.

Most airbrushes have the adjustable gasket. Here is the one from an Iwata Eclipse airbrush.

The white part is the PTFE. The screwdriver slot in the rear allows you to adjust tension on the needle by crushing the gasket. It installs from the rear of the airbrush, and the trigger mechanism must be removed to get access. A toothpick helps to get it started, and a jeweler's screwdriver works for adjustment. It is usually a very sensitive setting. There should be just a little drag on the needle as it passes through.

Badger is the only company I know of that uses a pressed in bearing. Here it is next to an X-acto blade for scale. It's just a tiny piece of Teflon tubing.

It is non-adjustable, and Badger recommends that the airbrush be returned to them for replacement. They will do it free for life. That sounds like a bother, but if you take care of the airbrush, it will probably never need to be replaced.

The plain hole in the body approach is very rare. I have only seen it in a few Thayer & Chandler airbrushes. It works because the clearance is so small and pressure so low that capillary action keeps the paint from leaking. Since there is no bearing or seal, there is very little drag on the needle. The hole does need to be kept clean though.

Paint source

There are three ways that paint can enter an airbrush; from the top, the side, or the bottom.

Gravity fed

A top fed airbrush is commonly referred to as gravity fed. Here is an example, the Iwata Eclipse HP-CS.

Paint is held in a cup on top of the airbrush. It may be permanently attached, as on the Eclipse, or it may have interchangeable cups of different sizes. On some detail airbrushes, there is no cup at all, just a cut out area for a few drops of paint. Gravity feds with larger cups usually come with a cap to prevent spillage. The cap will always have a tiny vent hole.

Siphon fed

A bottom fed airbrush is commonly referred to as siphon fed. As an example, here is the Badger 155 Anthem.

Paint is drawn up from below by Venturi vacuum at the nozzle. There are a variety of bottles and cups available to hold the paint. Here are three examples.

The tubing size of the bottles and cups seems to be a standard. They all seem to fit.

Is it really a siphon? Well, no, not technically. According to Wikipedia, a siphon is a tube that allows a liquid to flow over the edge of a container without external power as long as the exit end is lower than the surface of the source. My copy of Webster's New World Dictionary agrees with Wikipedia. Anyone who has

used a piece of tubing to drain an aquarium has seen this. If you raise the output end above the aquarium level, the flow stops. There is some disagreement as to whether this is due to atmospheric pressure difference or gravity, but the source is always higher than the exit.

Obviously this isn't what is happening in a siphon fed airbrush. The source, whether a cup or bottle, is lower than the nozzle, and the liquid is drawn up by a vacuum. It is really a vacuum pump. It is really more correct to say the airbrush is bottom fed. But, it doesn't really matter what you call it as long as you understand how it works.

There is also a biological use of the word siphon to mean a tube in general. But an airbrush is not biological as far as I know.

Side fed

The side fed airbrush is not as common as the other two types. But it has some advantages. Here is the front end of a Badger 100SF airbrush.

This type comes in both left and right hand models. And some have holes on both sides and a plug so you can switch back and forth. As you can see, in this brush the paint sits lower than the head, making it functionally the same as a siphon fed airbrush. There are side fed airbrushes, such as the Aztek, that have cups that sit higher and are essentially gravity fed.

Since the cup can pivot, you can set its angle any way you like. So, if you are painting the ceiling, floor, or anywhere in between, you can maintain the cup level. And, with the cup being off to the side, it is out of the line of sight of the airbrush. Some people prefer that.

Which is better, siphon or gravity fed?

If you ask that question on an airbrush or modeling forum, most responders will say a gravity fed airbrush is the best choice. They will say it is easier to clean, wastes less paint, and can do finer lines at lower air pressure. Let's look at these claims.

Easier to clean?

Because the cup is part of the body of the airbrush, there is no separate cup to clean. True, but some gravity airbrushes take more time than some siphon airbrushes. And there is still a cup to wipe out and flush. The only extra part on a siphon cup is the spout, which just takes a minute. A bottle is a little more work. A lot of people go to way too much trouble cleaning their airbrush. More on that later.

Wastes less paint?

They will say they can put just a couple drops of paint in their gravity cup and spray almost all of it. I have found that I can put just a couple drops in my siphon cup and spray almost all of it too. If they say the siphon wastes more for general coverage, I have to ask “Where does all that extra paint go?” Of course, they are applying it heavier. Either they are being more careful with

the gravity brush because they know they have less paint in their cup, or the siphon airbrush has a larger nozzle.

Finer lines at lower pressure?

Let's compare apples to apples. Fine line ability depends more on head design, needle profile, trigger sensitivity and skill than the method of paint supply. I have a Badger Patriot gravity fed and a Badger Anthem siphon fed airbrush. They are the exact same design except for method of feed. All parts, including the head and needle, are interchangeable. As far as I can tell, they spray exactly the same using the same components. Yes, gravity does aid paint flow in the gravity fed brush, but the difference in required air pressure for a siphon brush using a metal cup is minor. They might say that a bottle gets in the way when you are trying to get close. That's true, but you can use a metal cup that doesn't get in the way.

If you need an airbrush for extremely fine work, you will need a gravity fed airbrush. But this is mostly because the really fine nozzles and needles are only available for this type. On the other hand, if you have only one airbrush, for most uses, a siphon fed is much more practical. You always have the ability to use a bottle for those bigger jobs. And you won't have to worry about running out of paint in the middle of the gloss coat on your model car.

Air Sources

I have less experience with various air sources than I do with airbrushes. So some of what I write here is secondhand information. But I believe it is accurate. I started out with a small 1/8 hp diaphragm vacuum pump that I found could be used as a compressor. I was limited to about 25psi. I put a pressure regulator on it so I could step that down, and hooked it to a tank. It worked just fine. Later on, I was fortunate enough to receive two different airbrush compressors to review, and I upgraded my setup. You can see the reviews and my rig on my website if you are curious.

What are your choices?

Some low priced airbrushes come with an adapter for canned gas. The canned gas is not very effective, doesn't last long, and soon gets expensive. The can gets cold during use and the pressure drops off fast.

One really nice way to go is bottled CO2 or Nitrogen. There is no noise and you never have to worry about moisture. But, of course, there comes a time when the bottle needs to be refilled, and you will have to lug it some place where they do that. I can't give you details, because I haven't really looked into it. But I have seen it highly recommended many times.

I think most people use a compressor of some sort. One option is a shop compressor. They can easily handle the requirements of an airbrush. And you can also use them for other purposes, like powering tools or filling your tires. But they tend to be very noisy. They typically have a holding tank, which they charge up and then shut down until the pressure drops to some lower limit. The tank allows you to spray for some time until the compressor kicks in again, and this might be right in the middle of some delicate work. One solution is to locate the compressor some

distance from where you are and run the air through a long hose. I understand this can work very well.

Another option is a small, specialized compressor designed for airbrush use. If money is no problem, there are so-called silent compressors. Some of these are based on refrigerator designs, and make very little noise. In fact, you can find instructions on the web to convert your own, if you're handy. But most hobbyists probably end up with a small oiless piston or diaphragm compressor. These come with and without tanks, and you can find discussions in the forums on which type and brands are best. My experience is limited, so I won't make any recommendation. I will only say that I have seen a number of people who have had problems with the tiny ones that are housed in a plastic case. I would avoid one of these. They seem to be too marginal for many airbrushes, especially the external mix type of brush that requires more air. I would advise at least a 1/8 hp motor. Some small compressors come with an adjustable bleeder valve instead of a regulator. This is better than nothing, but a real regulator will give better control.

Need a tank?

Common belief is that without a tank, pulsations from the compressor will affect the output of the airbrush. A tank is a nice thing to have. It allows the compressor to rest between re-charging, and it cools and smooths the air flow. But there are many airbrush compressors on the market that lack one. I have connected my little diaphragm compressor directly to an airbrush, and could see no difference at all. My feeling is that, if it makes a difference, it's not much.

Moisture separators

Unless you live where it's very dry, you are probably going to want one of these. In fact, you may need a couple. If you have a compressor that has a regulator/moisture separator mounted right on it, some moisture can still get through. That's because a

moisture separator only works if the moisture is in liquid form. When air is compressed, it gets hot. You've probably seen this if you have used a tire pump. The hot air carries moisture as a vapor. A pressure regulator causes some of it to cool and condense. But, if the air is still hot, some moisture can pass right through the separator, only to condense back to liquid further down the line, like in your hose or airbrush. To trap this, you can get add-on separators that fit your hose or airbrush. Another option is to place a tank, some metal pipe, a length of hose, or other means of cooling the air a little before it reaches the separator.

Fittings

Most airbrushes have a 1/8 inch connection for air. The internal diameter is roughly 1/8 inch. For some reason, Badger/Thayer & Chandler, Paasche, and Aztek had to be different. Each of them has a different size. So, a hose for one won't fit the others. However, adapters are available for most combinations. Quick connects are also available, and they are pretty standard.

At the other end of the hose, a 1/4 inch connection is fairly standard for airbrush compressors and hoses, but you may come across a 1/8 inch fitting. The threads on airbrush hoses are not tapered like water pipes. Instead, the seal is accomplished by either a gasket of some kind or a smooth metal to metal joint. It's common to find people using Teflon pipe tape, but it really shouldn't be necessary. It's like using Teflon tape on your garden hose, and I doubt whether you do that.

Leaks

Most airbrushes leak a little air unless you glob them up with a sealant like bees wax or Chapstick. If you put soapy water on them and press the trigger, you may see a few bubbles around the head or from the trigger slot. A lot of people worry about this and coat the threads with something to stop it. Many artists claim it makes a difference in the way the brush sprays. I don't agree. I

don't see any difference at all. The loss of air is so minor in comparison to what comes out the front that it just doesn't matter. The only joint that might need some sealant is the internal one between the nozzle and body. If it leaks you will get bubbles back into the paint supply. But a little bees wax or Chapstick on the other joints couldn't hurt if it makes you feel better. I would never use Teflon plumbing tape on an airbrush. The threads are too delicate.

Pressure setting

The right pressure is the pressure that works best for you with your airbrush and paint. It will probably range between 8 and 30psi, but there is no magic number. Thicker paint needs more pressure. T shirt artists who use heavy fabric paint may use up to 50psi. Setting the pressure is part of learning to use the airbrush.

The question often arises as to whether the pressure should be set with the trigger up or down. It's normal for it to drop a few pounds when the trigger is pressed. I can't see where it makes any difference. As I said above, what matters is how the airbrush is performing..

MAC valves

MAC stands for micro air controller. All it is, is a variable restriction in the air path, sort of like a fine adjust faucet. Some airbrushes come with one built in. It will be a little knob underneath the front of the brush. MAC valves also come as an accessory that goes between the airbrush and the hose. It supposedly allows fine adjustment of air pressure right at the airbrush. I've never used one. Opinion on them seems pretty much divided between they're a gimmick and they are very useful. You can accomplish the same thing by adjusting the pressure regulator. And this is pretty easy if the regulator is located next to your work area.

Safety

Before I go any farther, I should talk about safety.

You know that solvents aren't good for you. So use common sense. If you use solvents, vent them outdoors and protect your lungs and those of your family. My hobby room is in the garage, and I have a door to the outside. I leave the door open, run a fan, and wear a mask with organic vapor filters. I spray mostly enamels and clean with lacquer thinner. But even water based paint is a risk. The mist generated by an airbrush is really fine, and can drift a long way. And I have read that the dust from acrylics isn't really safe. A particle mask might be a good idea when using them.

If you have room, you might want to buy or build a spray booth. Plenty of examples can be found on the internet. My only advice is to make sure the fan is big enough to keep the percentage of vapors below the LEL (lower explosive limit) of the solvent you are using. If you are below this limit, sparks don't matter. For lacquer thinner, it's about 1%. 1% would smell pretty strong. So, if you can't smell anything, you're probably pretty safe.

If you watch many airbrush videos, you will see lots of people spraying without any protection. You have to decide what makes sense for you. If you are gently spraying tiny amounts of water based paint or ink, maybe you don't need anything.

What about your hands? I use Nitrile gloves when I handle lacquer thinner. It eats latex.

Cleaning

If an airbrush isn't kept clean, it won't perform well. So cleaning is a must. But it is also the main reason people give up on airbrushing. I have seen statements that they spent a couple minutes spraying and a half hour cleaning up. Something is wrong here. Some airbrushes are more trouble to clean than others. But in any case it shouldn't take more than about 10 minutes. The best procedure varies from airbrush to airbrush, but here are some guidelines.

Dry paint is much harder to remove than wet paint. I bet you knew that. So don't put off cleaning.

You only need to clean the parts of the airbrush that actually contact paint. This seems pretty obvious, but some people do a complete tear down after each use. You should practically never have to dismantle the rear portion of an airbrush.

Don't use ammonia to clean an airbrush. It attacks brass and chrome. A lot of people use Windex with ammonia with no problem. But the amount of ammonia in Windex is very small. So it is probably pretty safe if you rinse well with water afterward. I don't use acrylic paints, but I have read that some users clean with household spray cleaners or alcohol. Do some Googling to see what works best for your paint.

Don't get solvents in the air valve. The rubber parts will swell and jam.

So, what's really necessary?

A lot of Pros and even some manufacturers will say that all you need to do is to wipe out the cup and back flush and run solvent or cleaner through the airbrush until it comes out clear. That's probably fine if you are just changing colors. But for end of day cleaning, I haven't had much luck with that approach. Sometimes

I would come back and find the needle stuck. I found that I have to at least pull the needle and wipe it off.

By the way, if your needle is stuck, try not to force it. You could damage the needle seal by pulling dried paint through it. Put a little lacquer thinner or acetone in the front part of the airbrush and let it soak a few minutes. If you have been spraying acrylics, I've heard that soaking the airbrush in very hot water can free it up. Remove the nozzle and try pushing the needle forward.

What's back flushing?

Back flushing means somehow blocking the front of the airbrush so that air is forced back into the paint reservoir, causing bubbles. You could use your finger, or a paper towel. Some head designs make this difficult and you might have to resort to holding something like the rubber bulb from an eyedropper over the nozzle. It is supposed to dislodge paint and is widely recommended as part of the cleaning process. I feel like I get better results by pumping solvent in and out of the cup or paint input with an eyedropper.

Which way the needle?

A common piece of advice is to always remove and install the needle from the front of the airbrush. The rationale is that by doing this, no paint will be drawn back through the needle seal and into the rear of the airbrush. And by re-installing from the front, there will be less chance of damaging the point of the needle. It's hard to argue with that logic, and it may make sense for many airbrushes. But there are things to consider.

To do this means removing the nozzle. This is no big deal if the nozzle is the larger, easy to handle type. But if it is one of the tiny threaded ones like the Master G-22 shown earlier, there is a significant chance of damaging this fragile and expensive part.

If you remove the head with the needle in place, there is always the chance of bumping its delicate tip. You could draw the needle

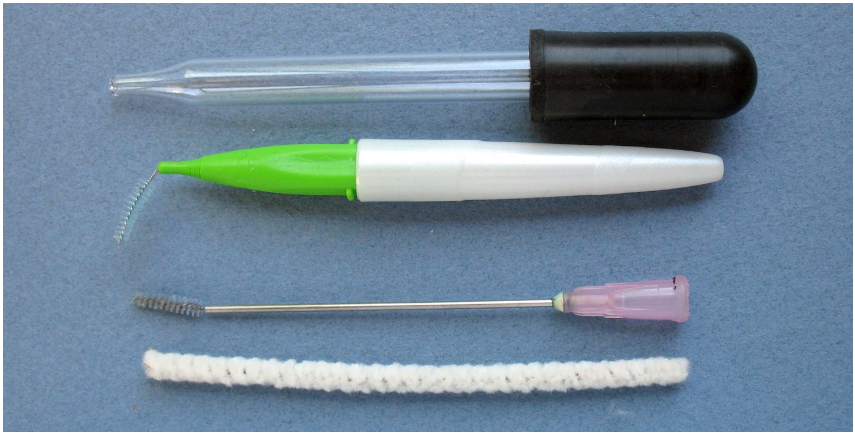
back a bit first, but that kind of defeats the reason for pulling it out the front.

Another possible concern is that there may be identifying grooves at the rear of the needle. If there are any burrs here, it might scratch the inside of the needle seal and cause a leak.

What do I think? Well, the needle of my favorite airbrush, the Badger 155, has a knob on the back. So it can't be pulled out the front. And when I pull it out the rear after a good flush, there is usually just a tiny smear of paint on it, nothing that's going to gum up the trigger area. The forward end of the needle is clean, which leads me to believe that the needle seal is getting a pretty good wipe by the time the needle is out. And the needle chuck on the 155, like most airbrushes, has an entry taper that helps guide the needle in. I always hold the needle very loosely, in case I do miss the hole. This has worked just fine for me so far.

Note: Always make sure the trigger is fully in place before installing the needle.

Here are my cleaning tools.



I use the eyedropper for flushing solvent through the airbrush. I like the glass type. When the rubber starts to rot, I pick up a

couple more from the drugstore. Below it is a fine interdental brush that also came from the drugstore. It stands up well to lacquer thinner. It's bent over because I use it to scrub out the front and rear openings in the cups of some of my gravity fed airbrushes. In most gravity fed brushes, there is a space between the cup and the needle seal. It is difficult to flush, and paint can build up in it after a while. I like to swab it out.

Next down is my own invention. I took the needle from an ink refill kit and hot glued the bristles from an interdental brush on the end of it. The needle is so thin and long, that it will reach just about anywhere in an airbrush. I don't like the commercial airbrush cleaning brushes. The bristles are too stiff, and even the smallest is too large.

At the bottom is a pipe cleaner. It's the best way I've found to clean out the spout of a siphon cup or bottle. Buy good quality ones meant for pipes, and rinse the spout after using to remove any stray fibers.

I also use an old paint brush to remove any paint from the front of the head.

Here is another aid I came up with.

I cut off the end of a wooden clothespin and filed a couple grooves in it. Using it, I can easily pick up the tip of my 155 and hold it for cleaning. It saves some fumbling.

Here is my waste can.

It's just a coffee can with a piece of copper tubing sitting in it. On the end is a piece of 1/4 inch rubber hose that I press the airbrush up against when I flush. A lot of the mist condenses in the tubing and drips in the can. I use an open metal can because I clean with lacquer thinner and I don't want to create a potential bomb. I set the can outside afterward and the lacquer thinner quickly evaporates. You can buy commercial cleaning pots or just use a trash can. Either would be fine for water based paints.

As you may have gathered, I do a little more than flush to clean. The airbrush I use the most is my Badger 155. The head assembly is so easy to remove that I do it every time and scrub out the front of the body. It just takes a few minutes. It's probably not necessary, but I feel better doing it. There are step by step pictures on my web site if you are curious.

I seldom remove the tiny threaded nozzles from the airbrushes that have them. I find them a pain to deal with. They are easy to damage, and the threads have to be resealed. Flushing will have to do for them. If you do remove one, be very careful not to cross

thread it when you re-install. Don't force it. It should go in easy, and barely tightening should be enough. If there are no bubbles in the paint cup when you spray, the seal is OK.

For the external mix airbrushes, like the Paasche H or Badger 350, I have found that I have to remove the needle and flush the nozzle to get it really clean. But, this is super easy and quick.

Different airbrushes need different approaches. But don't make it more work than it has to be.

Cleaning the Nozzle

I've generally found that a good flushing with solvent is enough to get the nozzle clean, with maybe a quick scrub using an interdental brush. But suppose you end up with some dried crud in it. What to do? Some airbrush manufacturers offer a special reaming tool for this purpose. And some people use an old airbrush needle to dislodge dirt. I find this approach kind of risky. If you need to probe, a whittled down toothpick is a lot safer. You can even twist a tiny piece of cotton on it and make a pointy swab. The safest approach is to soak the nozzle in solvent or cleaner and flush with an eyedropper. But if it has any rubber o-rings on it, they should be removed first.

When a nozzle is clean, you can hold it up to a light, look in the large end with a magnifier and see a shiny interior

Ultrasonic Cleaning

Some people buy ultrasonic cleaners for their airbrushes. The claim is that they remove paint particles that you would otherwise miss. I've never seen the need for one myself. But, that might be because I use lacquer thinner and enamel paints. If you have problems with clogging, it's something you might want to investigate.

Airbrush lube?

Some airbrush manufacturers sell a product called airbrush lube or needle lube. Some folks recommend applying it to everything that moves in your airbrush. It's supposed to be safe for all parts. My experience is that it gets sticky after a while and gums things up. At the most, I might wipe a tiny bit on the needle after cleaning. If I feel that metal to metal surfaces need lubing, I'll use a tiny bit of light oil or Chapstick.

Practice

I'm a strong believer in learning to walk before you try to run. So, my advice is to start simple.

First, before you even begin, maybe you should try removing the parts that will need cleaning. If you have problems, at least the airbrush is not full of paint yet.

Examine the parts diagram that should have come with your airbrush. If you do a search on Youtube, you might find a video for your brush. Loosen the needle chuck and pull the needle out. You may have to remove the handle first. Be careful with the needle. Not only is it fragile, it is also super sharp. Now, loosen the head and remove it. You may need a special wrench. If the head is knurled, it should be finger tight. Sometimes this is not the case and you may need to grip it with something. The safest thing is a clothespin. It won't mar the chrome finish. If that doesn't work, you may need pliers. But protect the finish with something like a piece of leather. Inside you should find the nozzle. If it is the tiny type that threads into the body, leave it alone. If it drops out or is large enough to be easy to handle, go ahead and remove it.

Usually, the head itself is not in contact with the paint flow. The only cleaning it might need is to remove a little splash-back from the front end. An old paint brush and some solvent make fast work of this.

This is as far as you should normally need to disassemble the airbrush for cleaning.

Now, put it back together, head assembly first. When you install the needle, press down on the trigger and feel the spring underneath. You don't want to snag the needle on it. Hold the needle loosely in case you miss the hole in the needle chuck. You should feel a little drag as the needle passes through the needle

seal. Press the needle lightly until you feel it bump into the front of the nozzle. The nozzle is fragile, so don't use too much muscle. Now tighten the needle chuck. And you are ready to hook up air and spray.

But before you reach for the paint, try spraying a little plain water. Make sure there are no bubbles in the supply cup or bottle and that water doesn't begin spraying until you pull back on the trigger. Control should be nice and smooth. If you see a problem here, fix it before you go on. Rather than give specific fixes at this point, I will refer you to the troubleshooting chapter. But hopefully everything looks OK.

There is one more thing I would try before real paint. Get some ink or liquid food colors and spray them on a paper towel. You can clean up with plain water, and you won't have to worry about thinning. Do a Google search for airbrush exercises. You will find plenty. Do some of them to get a feel for how your airbrush performs. If it is a double action, try to make it automatic to press for air, then pull back for paint. At the end of a line, push forward to stop the paint before stopping the air. That will reduce spitting caused by paint build-up on the front of the nozzle. It takes practice to develop muscle memory so you don't have to think about it.

Some people will claim that they can control airflow by how far they press down on the trigger. However, with most airbrushes there is a very tiny difference between full off and full on. The Testors Azteks are an exception. The general consensus is that the best practice is just on or off. It's tricky enough to control paint flow by pulling back on the trigger without trying to vary the air at the same time.

Once you are comfortable with ink or food colors, try paint. Buy some of the paint you plan on using. There are probably different thinners that will work with it. But to start out, I would use the manufacturer's brand. Sure, it's more expensive, but you can experiment later.

If you are going to paint on hard surfaces, practice on hard surfaces. Empty plastic bottles work fine for this. Experiment with air pressure and thinning. Try spraying at different distances and see what effect it has. Figure on using up a whole bottle of paint. Consider it an investment in your skill. It will pay off later when you are doing something important. This is also a chance to work out the bugs in your cleaning routine. It gets easier and faster with practice.

Thinning

One thing that trips many people up is thinning. Paint has to be really thin to airbrush well. I'm talking 2% milk thin. To see what this looks like, put a little 2% milk in a metal or glass cup. Now swirl it around and notice how it coats the side. Dip a stick in it and see how it drips off. That's what your paint should look like. Airbrushes with small nozzles of .3mm or less need even thinner paint. Some paints are labeled as airbrush ready. That depends on your nozzle size and air pressure. Thicker paint needs more pressure. On the other hand, thinner paint may take more coats to get the coverage you want. Paint spray-ability varies from brand to brand, and even color to color. This is where experience and practice comes in. You will soon be able to tell when things feel right.

Thinners

You can find all kinds of advice on thinners on the internet, everything from water to windshield washer fluid for acrylics, and various solvents for oil based enamels. I assume that most of them work OK. But, before you try something in your airbrush, mix a little in a saucer first. Make sure it doesn't clump up and that it dries in a reasonable time. There is something called flocculation that occurs when a paint and thinner don't mix well, and it's not pretty.

I only use enamel paints. And I've found for me, either lacquer thinner or mineral spirits at about a 50:50 mix usually works pretty well.

Tip Dry

Tip dry is when paint dries and builds up on the needle. It causes a distorted spray and eventually blocks the spray altogether. It can happen with any paint, but is more common with acrylics, because they tend to dry faster. So if you use acrylics, you will probably see it. Special retarders are available that, when added in small amounts, will reduce or eliminate it. Do a little research and see what works for your paint. This is where membership in a forum can pay off.

You can keep a paint brush or cotton swab with some thinner on it to wipe it off. Or, many artists use their fingernails to pick it off. Many will do this automatically after every couple of strokes without even thinking about it. Some will even modify their airbrush to make picking easier.

Sometimes just a good squirt of paint on some waste material is enough to blow it off.

Troubleshooting

I have monitored several airbrush and modeling forums and I've seen a lot of postings about airbrush problems. People try to help, but sometimes it's pretty tough. How do you respond when somebody writes: "My airbrush doesn't work. What's wrong with it?" Okay, that's an exaggeration, but not by too much. So if you ask for help, try to give as much information as you can. Include the airbrush brand and model, the type and brand of paint, the thinner and thinning ratio, the air pressure, exactly what the symptoms are, and what things have you tried so far. I know this is just common sense, but many people just don't think about it. And if you do get help, please come back with the results, and maybe even say thanks. Not only might you be helping someone else with the same problem, but the person who helped you might be more inclined to help you or others in the future.

You will probably be advised to clean your brush again. This is a pat answer, and it often works. And you may be frustrated because you know you've cleaned the darn thing several times already. But it doesn't take much dirt to mess up an airbrush's operation. A tiny piece of lint can do it. I would suggest you use a magnifying glass (at least 6X, and 10X is even better) and a good source of light and really examine all the parts.

Some airbrush problems are really paint problems. Before you blame the brush, see how it works with plain water or thinner. Paint has to be really thin to work in an airbrush, especially if it has one of the smaller size nozzles like .2 or .3mm.

If you haven't read the **How does it work** and **Mechanical parts** chapters, you might want to have a look at them. It may make the information below easier to understand. As you can see if you've read that section, the airbrush is basically a pretty simple device. But it is a precision device, and tolerances are tight.

One other thing; spare parts are nice to have, especially the needle and nozzle. You can quickly eliminate these as the cause of your problem by swapping them out.

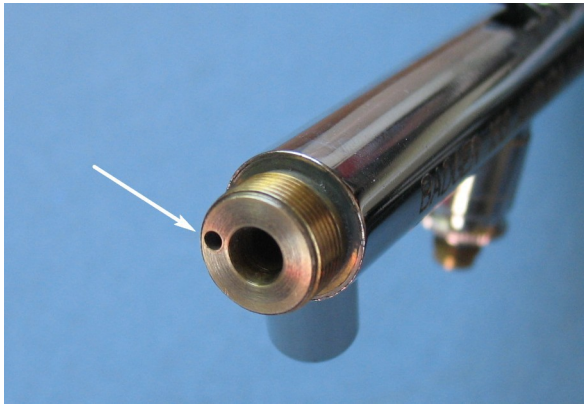
So what kind of things can go wrong?

No air comes out or comes out continuously

Obvious question: Did you disconnect the air line from the brush and check that your compressor or other air source is supplying plenty of air?

Some trigger mechanisms are tricky to install. Are you sure yours is in right? Can you feel the air valve spring when you press the trigger?

If you remove the head assembly, there is a little hole in the main body where air should come out when you press the trigger. Here is a photo showing its location on the Badger 155.



If air does come out, then the problem is probably something clogging the head assembly. Inspect it and clean it. On some airbrushes, there is very little space around the nozzle for air to exit. If the nozzle has been flared by pushing too hard with the needle, it may block the air path. The fix for this would be to replace the damaged nozzle.

If air doesn't come out of the hole, there may be something blocking the air passage in the body, or the air valve assembly may be bad. Hopefully, there is no dried paint blocking the little hole. If there is, you may have to soak the body in something to soften it so it can be blown out. Be sure to remove the air valve assembly before doing this, so you don't damage the little O-ring in it.

If you have to dismantle the air valve assembly, be very careful. There are some very small parts and a tiny spring. Here is a photo of a Grex air valve assembly. I used pointy tweezers to unscrew the keeper.

Notice that the spring is smaller on one end. It must be re-installed the same way. There is probably a little rubber O-ring that could be damaged. If you've gotten lacquer thinner on it, it may have swollen enough to jam. It may return to normal if you let it air out for a few days. If not, you may have to replace it. Make sure all the parts are clean and work smoothly. Many advise applying airbrush lube. I don't, but I guess it couldn't hurt.

Sticky Trigger

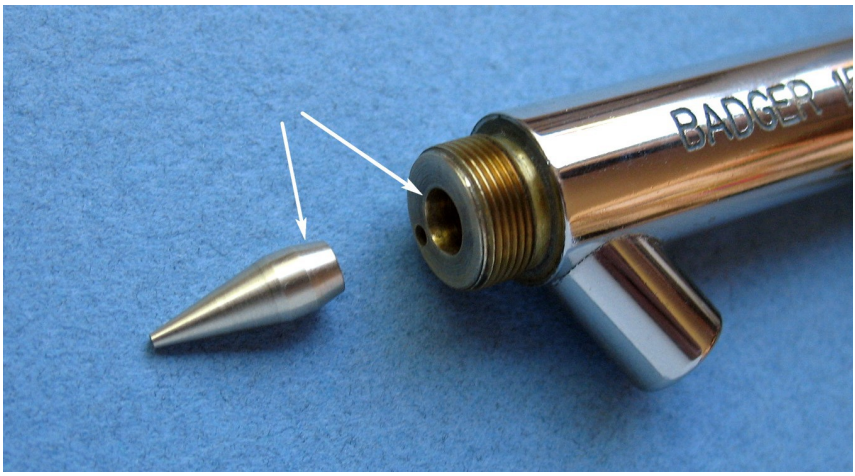
For some reason I seem to see this problem most often from Iwata owners. They usually write that they clean the air valve assembly, and it works OK for a short time and then begins sticking again. Sometimes they mention finding paint residue in the valve. If there is paint, where did it come from? The only

possible source is through the needle bearing. Either they are pulling the needle out when there is still paint in the brush, or the needle bearing is leaking. In some airbrushes there is an adjustment on the needle bearing that might stop a leak. If not, or if that doesn't work, the bearing needs to be replaced.

In some airbrushes, the trigger pin passes through a rubber o-ring at the top of the air valve. It may need a tiny bit of lubrication. Most users and manufacturers recommend regular airbrush lube.

Bubbles in the paint cup

This seems to be the most common problem people have with their airbrush. It shows up regularly on the forums I monitor. First, make sure the head assembly isn't loose. Snug it up, but don't over-tighten or you might strip the threads. If that doesn't do it, then consider this. The only way bubbles can happen is if there is a leakage from the air path to the paint path. Now look closely at your airbrush. If you have the type with a floating nozzle (aka tip), there is no gasket between it and the main body of the brush. Here is a photo showing these parts on the Badger 155 airbrush.



The arrows point to the surfaces where the parts mate. Paint flows inside the nozzle and air flows on the outside. The only thing keeping them apart is the metal to metal seal. This seal is

only good if both the nozzle body and the hole it fits into are perfectly round and dirt free. One way to see if there is a problem here is to rub a little bees wax on this part of the nozzle and see if the bubbles go away. If they do, you may need a new nozzle.

If your airbrush has a screw-in nozzle like the Badger shown in the photo below, you may have a gasket, possibly made of Teflon, to seal off the nozzle to body joint.

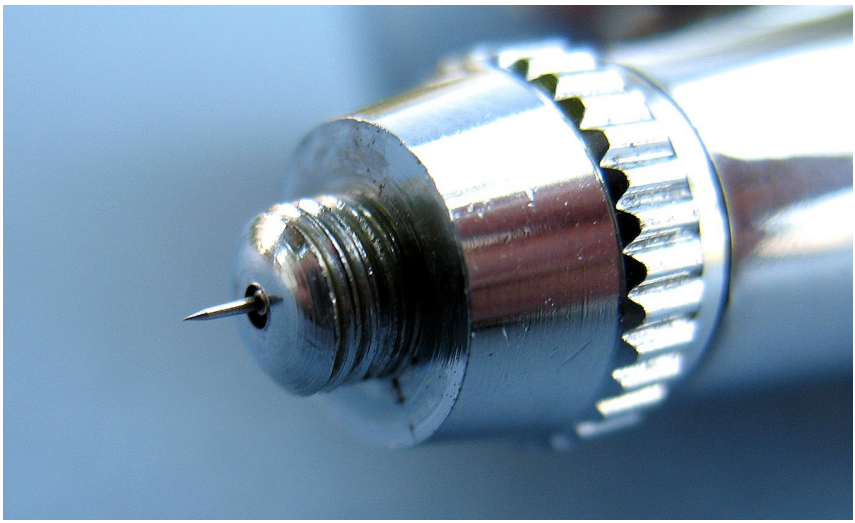
You didn’t lose the gasket did you? Over time, these gaskets can be compressed enough that they leak. This is an easy fix. Just replace the gasket. I've also found that a little lip balm, like Chapstick, on the threads can solve the problem.

If you have a tiny screw-in nozzle like the Iwata HP-CR shown next, you may need some sealant like bees wax or lip balm on the threads.

Be extremely careful not to over tighten it. If the nozzle breaks off and leaves the threaded part in the body, you may be able to back it out with the point of a hobby knife or a small triangular jeweler's file.

The only other place that air can get into the paint path is at the tip of the nozzle, like when you back flush by holding your finger or a paper towel against it. A tiny crack in the end of the nozzle can cause bubbles. Check it closely with a magnifying glass. I've read that paint build-up can occur here and also cause bubbles. I've never seen this, but it's worth checking for.

In order to create a vacuum to pull paint out of the brush, the nozzle has to protrude just a tiny bit past the front of the spray regulator. If it doesn't, you can get pressure instead of a vacuum here and air will blow back into the cup or bottle. This can be a problem especially in airbrushes with rubber O-rings in the head assembly. If the bubbles don't appear until the trigger is pulled back, this is a likely cause. Here is a photo of a Master G-22 head with that problem, showing what it looks like.



Intermittent spraying

This can be caused by the same things listed above for bubbles in the cup. For a siphon fed brush, it can also be caused by a worn or damaged needle bearing or seal. If the needle seal of a siphon fed airbrush leaks badly enough, it will introduce bubbles in the paint chamber. These can cause the paint spray to start and stop. Usually the spray will pulse, sometimes only at certain trigger positions. But, it may stop completely. The spray should be continuous from trigger all the way forward to all the way back.

To test for this, remove the cup or bottle. Turn the airbrush upside down and put a little water or thinner in the paint input. Spray it out. If the problem goes away, it was likely due to the needle seal leaking.

If the seal is the adjustable type, it may just need tightening a bit. There should be just a little drag when the needle is removed or installed.

Continuous Paint

A common problem is that paint will spray as soon as you press the trigger for air, even before pulling back the trigger. This happens because of an imperfect seal between the needle and nozzle. It sometimes doesn't show up at lower air pressures. It can be caused by a small particle of dirt or dried paint in the nozzle, or a needle or nozzle that is not perfectly round. At low pressure, there is not enough vacuum to overcome the paint viscosity and pull it through the small opening. When the pressure is increased, so does the vacuum and paint is expelled.

Sometimes it can be fixed by rotating the needle in the nozzle with slight pressure. Some people apply a little pressure to the back of the needle when they tighten the needle chuck. But you have to be careful not to damage the nozzle. Soaking the nozzle in a solvent that dissolves dry paint may also help.

Another possibility is that the needle seal is too tight for the trigger return spring to fully seat the needle. If the spray stops when you apply a slight pressure with your finger to the rear of the needle, this may be your problem. You may be able to adjust the trigger tension or the needle seal. You should feel a little drag when you install the needle, but it shouldn't take much force.

If you have polished the needle, you may have caused it to go out of round. If you have spares, try swapping parts to find the culprit.

Air but no paint

Maybe your paint is too thick or has lumps. You could try cranking the air pressure up a little to increase the vacuum, or you could see if the problem goes away when you spray plain water or thinner.

Sometimes people forget to tighten the needle chuck. They pull back on the trigger, but the needle doesn't move; easy to fix once you notice it.

Sometimes, if the needle is stuck from dried paint, the needle chuck will slip when you pull back the trigger, even though you tightened it. So check to see that the needle is really moving.

Make sure there is a vent hole in the cap of your siphon bottle or paint cup lid. Otherwise a vacuum will form and stop the paint from flowing.

In a siphon airbrush, a really leaky needle seal or needle bearing can cause this. To check for this, turn the airbrush upside down and put some water in the paint inlet. If it sprays OK in this position, then the seal may be bad. It may be adjustable or it may need to be replaced.

Bad spray pattern or spatters

Take a close look at the needle and nozzle. A bent needle or cracked nozzle can cause this. Acrylic paints seem to cause some problems. I've never used them so I can't comment. You can feel for a tiny burr on the tip of the needle by running your fingernail lightly along it. Swapping parts is one way to narrow the problem down.

Works for a while, then doesn't

I see this once in a while on the forums. The user says the airbrush works fine for a while, but before they can finish, it begins spraying bad or clogging and they have to stop and clean it. They often blame the airbrush.

Here's what I think. An airbrush is made of hard stuff, like metal or hard plastic. It isn't very likely to change much during a painting session. If it works when you start, it should work till you finish. So, what does that leave? The Paint! I doubt whether anyone sees this problem spraying ink.

Paint can dry on the needle during use, especially if it is acrylic, and especially if the user is in the habit of lifting off the air before returning the trigger all the way forward. This is called tip dry, and is a fact of life when using acrylics, and even somewhat with enamels. Some airbrushes are more prone to this than others, but I believe they all have it to some extent. You can use a brush or Q-tip and solvent to remove it or, like many artists, use your fingernails to pick it off. Sometimes a blast of paint on some scrap will remove it. If you watch many airbrush videos, you will see artists doing this often.

Another likely cause is lumps in the paint. If you don't keep your bottles clean, paint can dry around the mouth of the jar. Then, when you stir or shake, little bits can fall into the bottle and end up in your airbrush. An airbrush does not like lumps. Here again, this is more likely with acrylics because of their fast dry times.

So before you blame the airbrush, clean it well, try some fresh paint or ink and see if the problem goes away.

Rough finish, orange peel, runs, etc.

Sorry to tell you this, but it probably isn't the airbrush.

A rough sandpaper finish can happen if the airbrush is too far away from the object. The paint droplets partially dry before they hit and pile up on the surface.

Orange peel happens when the paint droplets don't flow together to form a smooth coat. Try slowing down and applying the paint a little heavier.

Runs happen when the paint is applied too heavy, or it's too thin. Thinner paint needs a thinner application.

Speckles are sometimes done on purpose to create a textured effect. Then, it's called stippling. It happens when the air pressure is too low for the viscosity of the paint. It can also be done by

placing something in front of the nozzle to bounce the paint particles around and scatter them.

When the paint makes a splat, it's called spidering. It happens when the paint is too thin, the pressure too high, or you are too close.

It just doesn't spray like it use to.

Two parts that are very critical to the way an airbrush sprays are the nozzle, or tip, and the needle. Over time, the nozzle can be deformed by pressure from the needle and take on a slight trumpet shape. Both the needle and nozzle can wear from abrasion of paint particles. And the needle profile may have been altered by straightening efforts or polishing. If your airbrush still works, but not as well as it once did, you may find that a needle/nozzle replacement will bring it back to its old self.

Air Hose Leak

If you have a leak at either end of the air hose, don't bother trying to stop it with Teflon tape or sealant on the threads. They are not meant to seal. The seal is inside the hose connector. In the Badger plastic hose, it is a cork washer. In the braided hose, it is a smooth metal surface. In my Iwata compatible Master hose adapter and Paasche hose, it is a rubber O-ring. In all three cases, it only works if it presses against smooth surface. So, the end of the airbrush connector and the compressor pipe must be smooth. A thin film of bees wax will help a lot. If you still have a tiny leak that only shows up with soap bubbles, don't worry about it. Percentage wise, it's insignificant.

Needle centering

If you look dead straight on at the front of an airbrush nozzle and pull back on the trigger, you may find that the needle pulls to one side. Some people notice this and think they have a bad airbrush. Not so. Here's the problem. An airbrush needle is only supported at two points, the needle seal and the needle chuck. The distance

from the seal to the front of the nozzle can be in excess of one inch. The nozzle diameter is a fraction of a millimeter. That's an awful small target to hit. So, it is common for the needle to end up slightly offset. Fortunately, it turns out it doesn't really affect the spray pattern. Unless it is so far off that it binds, it doesn't matter.

What does make a big difference is the centering of the nozzle within the spray regulator. If this is off very much, the pattern will be distorted.

So

In general, when you first get an airbrush, look it over carefully and study the parts breakdown so you understand how it works. It's pretty clear from some of the questions that are asked, that many people don't. I remember one instance where a fellow couldn't get any paint out of his new brush. Then he discovered that he hadn't removed the protective cap. At least he was honest enough to admit it.

Also, if you're still stuck, consider contacting the manufacturer or dealer. Most major manufacturers and dealers will do their best to help.

Straightening a bent needle

Maybe you got a little bit too close to your work. Or, maybe you dropped your airbrush or stubbed the needle during installation. Somehow, the needle got a little bent. What do you do? Here are some methods I've come across.

First off, how badly is it bent? If the needle is bent so much that it won't pass through the nozzle, whatever you do, don't force it. Nozzles generally cost more than needles and they are very fragile. Use pliers if you have to, but straighten the needle enough somehow so it will pass freely through the nozzle. If you

can't straighten it that much, you might as well clip it off with a sturdy wire cutters and buy a new needle.

The bend might be so tiny that you can't see it with the naked eye. The only thing you may notice might be a bad spray pattern. But if you run your fingernail lightly along the tip you may be able to feel it. I've found that I can often straighten this type by just dragging the needle across my foam cutting mat while rotating it. Try to keep the taper of the tip flat against the mat. A little pressure on top with your finger might help.

If the bend is a little more serious, I've done the same thing only with a fine whet stone or very fine polishing paper on a flat surface. Be sure to rotate the needle so it stays round.

The coin trick

A very common suggestion is to pinch the needle between two coins and pull it out. I haven't tried it, but I see it so much that it must be somewhat successful. You would probably have to repeat several times. You could also use one coin and a flat surface like a piece of glass. I found a video that claims a wooden hex shaped pencil pressing the tip against the glass works well. Again, I would rotate the needle as you pull.

Last ditch effort

If straightening just doesn't work, you can always try to reshape the needle as you can see in the Tuning chapter. A straightened needle may never be quite as good as a new one. But maybe you can get it good enough for most purposes.

Which airbrush should I buy?

Boy, if I had 10 cents for every time I've seen that question, I'd have a bunch of dimes.

There is no best choice. There are a lot of good airbrushes by quality manufacturers. Some people will recommend their own favorite. The funny thing is, there are lots of different favorites. Even the cheap Chinese copies have their fans.

So what's a beginner to do? First off, don't sweat it too much. If you buy a name brand from a reputable dealer, you will no doubt get an airbrush that functions well. It may not be the one you would choose if you tried them all, but it will do a decent job.

Do some research. Read some reviews (there happen to be a bunch on my web site). Watch some video reviews. Join a forum or two and ask for advice. But beware of comments that a particular airbrush stinks. It may well be the owner had a bad one or just didn't know how to use it. Besides, someone else may chime in and say it is an excellent airbrush.

Here are some of my thoughts.

For a first airbrush a 0.5mm nozzle is about as small as you should go. The parts will be a little tougher, a little cheaper to replace, and it will do pretty fine lines with some practice. And, they are less fussy about thinning.

For the same reasons, I don't recommend an airbrush with a tiny threaded nozzle. The ones held in place by compression are much easier to care for.

Consider the availability and cost of spare parts. Chances are you may need some.

If you are lucky enough to have the opportunity to actually hold a variety of airbrushes in your hand, by all means take advantage of

it. There's nothing like direct contact to show if you like the feel of something.

The resale value of name brand airbrushes is pretty good. So, if you take care of an airbrush, but decide you would prefer something different, you can probably recoup a good part of your investment.

Avoid the cheap no name airbrushes you see on E-bay and Amazon. Yes, you may get a good one, but you may not. Support is likely to be non-existent if you have a problem. It's very common to see a forum post from a beginner asking if one of these is a good airbrush to start with. Invariably, members will answer with stories about how they wasted money on one.

Consider whether you really need a dual action internal mix airbrush. For a lot of purposes, a simple external mix single action will do just fine. I have seen excellent models painted with one of these, and the learning time is much shorter.

I would not recommend a used airbrush for a beginner, unless you know the previous owner. Even if the seller says it works OK, it may have problems that will confuse and frustrate you. Fixing it could bring the cost almost to that of a decent new airbrush.

You can't buy skill. There is no substitute for practice.

Tuning

Are you the type that can't leave well enough alone? If so, you will probably eventually try tuning your airbrush. A lot of people do, including me. I do a little of this to all my airbrushes. But I don’t recommend trying it unless you’re willing to buy replacements for the parts you mess up.

By tuning, I mean making modifications or adjustments to improve performance. In the case of an airbrush, this can include polishing the needle or modifying or changing springs.

Ergonomics

Here are a couple simple tunes. Chrome is nice and shiny and easy to clean. But, it's kind of slippery, which can cause you to tighten your grip. And this can be tiring and affect your trigger control. I added some leather pads to some of my airbrushes, and it makes them more comfortable to hold. Double sticky tape or hot melt glue works well to attach it. Here is my Thayer & Chandler Omni 4000.

Another easy change is to add something to the top of the trigger. It not only improves the grip, but makes it taller. Here is my Badger 150 with a 3M self stick pad on the trigger.

Needle Polishing

Polishing the needle is the most common tune. Lots of airbrushers polish their needles, even with expensive brushes. But my guess is that most don't. Roughness on the tapered part of the needle might cause droplets to fly off before reaching the tip and increase over-spray. But the most common reason given for polishing is that a polished needle will have less paint build-up on the tip.

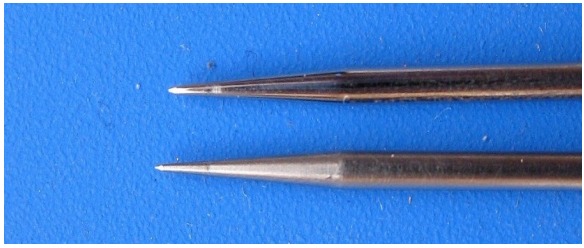
You can find a variety of instructions on the web for needle polishing, some involving tools like Dremel motors, hand drills and fine sandpaper. I have a very fine Arkansas stone, and I stroked a needle gently on it while rotating it and trying to maintain the right angle. I checked my progress frequently with a 25-power microscope. When I saw that the machining marks were gone, I switched to a leather strop charged with cerium oxide polishing powder. Then I finished off with liquid polishing compound on a paper towel. I ended up with a very pretty needle.

Did it help? Well, at least it didn't hurt. It may have given me a tighter pattern but I would say it is insignificant for my painting. The risk here is that if you change the taper of the needle, you might get a pattern you don't want. And if you cause the needle to be out of round where it mates with the nozzle, it may not seal off the paint completely when you release the trigger, and it could even lead to nozzle damage.

Some have advised matching the nozzle to the needle by working them together with polishing compound, like you might do to seat valves in an engine. I doubt whether this will do any good. But, if you try it, go easy. The wall of the nozzle is already very thin and easy to damage. Any honing can only make it more fragile.

A Cautionary Tale

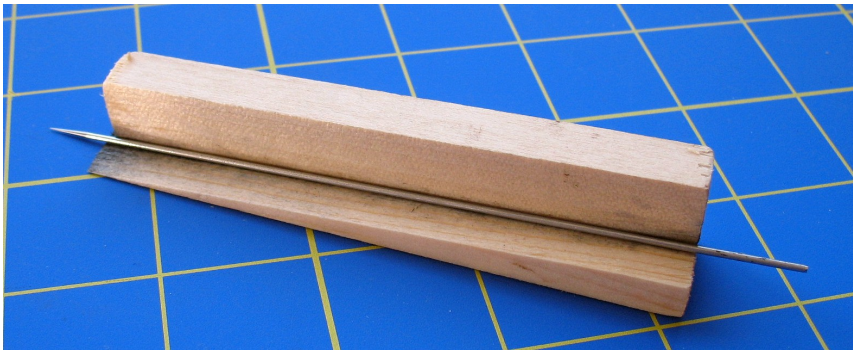
I was practicing with some food colors and my Patriot, and I couldn't get the fine lines I had in the past. I thought it might be me, so I tried my Vega, and it worked great. So I tried to figure out what was going on. I have some spare Patriot parts and I began swapping them out. It turned out it was the needle causing the problem. I had recently polished it. Here is the polished needle next to one that is untouched.



The polished one is the top one. Notice what I had done. Although it's nice and shiny, the profile has changed. It's pretty, but it doesn't work like it used to. This is what can happen if you're not careful.

I figured I had nothing to lose, so I decided to try reshaping it. Here is the result. The reworked needle is again the top one. Notice, it's not polished, but now it works great.

I made the simple fixture shown below to hold the needle at the correct angle. Then I taped a piece of 400 grit wet or dry paper to a sheet of plate glass. I worked the point against the paper while turning the needle with my drill motor. Notice that the ball is missing off the rear of the needle. I tried chucking it in the drill and it broke off. So, now I have to remove the handle of the Patriot to remove the needle. But, that's not a big deal.



Springs

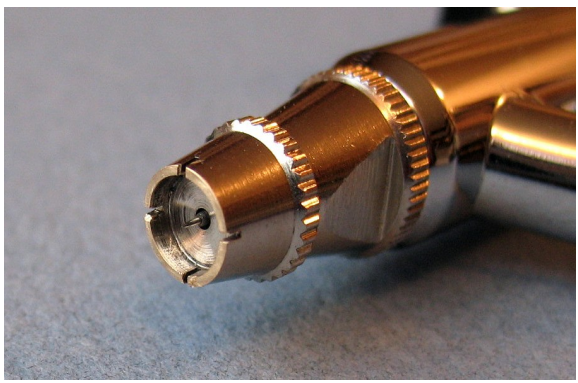
Another modification I do is messing with the springs. I like a light touch on the trigger. I have the tension on the back pull set about as low as it will go. And if it isn't enough, I change or alter the spring. The pressure to push the trigger usually seems a little heavy too. I read that the springs in ballpoint pens can sometimes be used, so I dismantled a bunch of old pens and found a few that

would work. It takes a little experimenting, and most had to be clipped a little.

I've also found that you can modify the tension of the original spring by clipping off a coil or two. I suggest you have a spare before you try this though. One word of caution: If you look at the original spring you might notice that the ends are finished off so they sit flat against whatever they push against. In other words, you can stand them on end and they will balance. If you clip off some loops, this will no longer be true. Sometimes, this can cause the spring to cock to the side when you install it, and this can result in some of the coils scraping against something. You will feel it if it does. You may have to play with the shape of the end coil to cure this.

Head mod

Here's another easy modification that is pretty common. The closer you can get to the media with an airbrush, the smaller the spray pattern will be. Some airbrushes have a protective section on the front of the nozzle that is removable, exposing the needle fully, and allowing for finer work. Many don't have this feature. On these, the protective extension of the nozzle is fixed and limits how close you can get. Some users of this type will file back the front of the head. Here is a photo of the head of a Harbor Freight Deluxe airbrush that I filed down.



This allowed me to get closer and produced a narrower coverage. It also makes it easier to remove any tip dry that occurs. Of course, it also increases the chance of needle damage, so you have to be more careful.

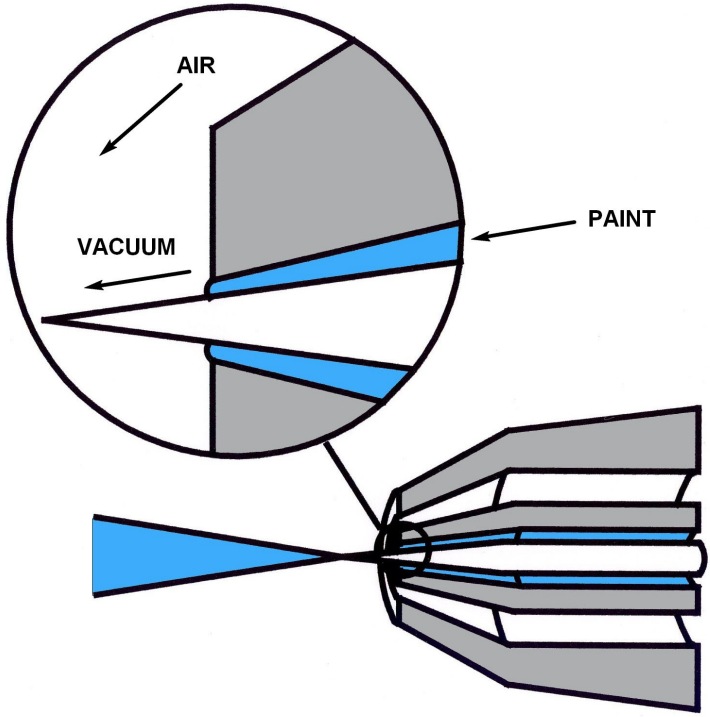
So?

Well, if you're mechanically inclined and like to mess with things, and you're willing to replace what you might ruin, go for it. Does something feel a little rough when you work the trigger? Take it apart and see if you can find what's causing it. Maybe a little smoothing or polishing will make an improvement. On the other hand, the airbrush probably works fine just as it came from the factory.

Fine Lines

The Holy Grail of airbrushing seems to be the ability to do fine lines. How fine? Well, pencil width is a common goal. But, of course, that depends on how sharp the pencil is. People will spend a lot of money on airbrushes that promise to achieve this. However, an old airbrush artist with about 40 years experience once wrote on one of the airbrush forums, “You can’t buy fine lines”. But, no doubt, some airbrushes make it easier than others. I’ve seen artwork done on cigarette lighters and even ballpoint pens that is unbelievable, and I'm sure these weren’t done with a large nozzle.

To see what your airbrush is capable of, spray something really thin, like ink or food colors on something absorbent, like paper towels. Get really close. You will find that it's a lot harder to do as well with paint on a hard surface. Why is that? Let's look at the head again.



Air blowing past the nozzle creates a vacuum. When the needle is fully seated, the paint path is blocked and nothing comes out. Pulling the needle back exposes the paint to the force of the vacuum. But, at first the area exposed is very small, and the force is not enough to overcome the viscosity and surface tension of the paint. And, still nothing comes out. Eventually, a point is reached where the area exposed to the vacuum is large enough to cause the paint to flow, and the airbrush will begin to spray. This is a pretty sudden transition.

The result is that you begin to pull back the trigger, and nothing happens. So, you pull back a little more and suddenly you get too much spray.

All liquids have some viscosity and surface tension. Paint has more than ink, so it is more difficult to control. Not only that, paint is a shear-thinning fluid. That means its viscosity is greater when at rest than it is when it is moving. In other words, keeping it moving takes less force than getting it started.

So, what to do? Well, thin paint is less viscous than thick paint. So, you will want to use thinner paint when doing close work. But, thin paint is more likely to splatter or run, and doesn't cover as well. A lower air pressure is usually advised. But, some claim to do better with higher pressure. In any case, it takes a steady finger on the trigger and lots of practice.

The spray angle of the airbrush and trigger sensitivity pretty much depend on the taper of the needle. A finer taper will generally produce a narrower angle. But, a finer taper means a smaller nozzle. Some are as small as 0.15mm. And, a nozzle this small means even thinner paint is needed. Plus, the needle and nozzle are very fragile, not to mention expensive. Unless you are doing really microscopic work, I think 0.25mm is about as small as you will ever need. And, I think most modelers can do just fine with a 0.35mm or 0.5mm nozzle. For really sharp edges or narrow lines, I think most airbrush artists use masks.

Tip dry

I mentioned tip dry in the Practice section, but it really applies here. As I wrote there, it is mainly a problem with acrylics, but can happen with any paint. Because you are barely pulling back on the trigger, and probably using a low air pressure, paint is very likely to build up on the tip of the needle. At first it will distort the spray, and eventually stop it entirely. You can plan on keeping a swab with thinner on it handy, or learning to pick it off with your fingernails. There are special retarders for acrylic paints that can help.

Conclusion

I hope my little book has been helpful. If you visit my website, you will find more tidbits and over 30 detailed airbrush reviews. Here is the URL:

https://sites.google.com/site/donsairbrushtips/

Or, just google Don's airbrush tips.

If you have any questions or comments, I can be contacted at downeyite@yahoo.com.

Thank you very much for having a look. I hope you enjoy airbrushing.

And, a very special thank you to those who take the time to post a review of the book on Amazon.

Don